

SEQUENCE LISTING

<110> University of Florida Research Foundation, Inc.
Klee, Harry J.
Tieman, Denise

<120> Materials and Methods for Synthesis of a Flavor and Aroma
Volatile in Plants

<130> UF.386CXC1

<140> 10/574,124
<141> 2007-04-23

<150> PCT/US2004/032599
<151> 2004-10-01

<150> 60/558,504
<151> 2004-03-31

<150> 60/508,568
<151> 2003-10-03

<160> 13

<170> PatentIn version 3.5

<210> 1
<211> 1367
<212> DNA
<213> Lycopersicon esculentum

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gttttaacgt cttccatagc tgcagttgct tacagtggtc agcctcggac acctgaggtt 600
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atattgcgtg acctttatcc tactatgcaa cttccagaaa agtgtgctga tgacaaccca     1020
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<210> 2
<211> 328
<212> PRT
<213> Lycopersicon esculentum

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<400> 2

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          20          25          30

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Lys Ala Ser Val Arg Asp Pro Asn Asp Pro Lys Lys Thr Gln His Leu
          35          40          45

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Leu Ser Leu Gly Gly Ala Lys Glu Arg Leu His Leu Phe Lys Ala Asn
          50          55          60

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Leu Leu Glu Glu Gly Ser Phe Asp Ala Val Val Asp Gly Cys Glu Gly
          65          70          75          80

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Val Phe His Thr Ala Ser Pro Phe Tyr Tyr Ser Val Thr Asp Pro Gln
          85          90          95

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Ala Glu Leu Leu Asp Pro Ala Val Lys Gly Thr Leu Asn Leu Leu Gly
 100 105 110

Ser Cys Ala Lys Ala Pro Ser Val Lys Arg Val Val Leu Thr Ser Ser
 115 120 125

Ile Ala Ala Val Ala Tyr Ser Gly Gln Pro Arg Thr Pro Glu Val Val
 130 135 140

Val Asp Glu Ser Trp Trp Thr Ser Pro Asp Tyr Cys Lys Glu Lys Gln
 145 150 155 160

Leu Trp Tyr Val Leu Ser Lys Thr Leu Ala Glu Asp Ala Ala Trp Lys
 165 170 175

Phe Val Lys Glu Lys Gly Ile Asp Met Val Val Val Asn Pro Ala Met
 180 185 190

Val Ile Gly Pro Leu Leu Gln Pro Thr Leu Asn Thr Ser Ser Ala Ala
 195 200 205

Val Leu Ser Leu Val Asn Gly Ala Glu Thr Tyr Pro Asn Ser Ser Phe
 210 215 220

Gly Trp Val Asn Val Lys Asp Val Ala Asn Ala His Ile Leu Ala Phe
 225 230 235 240

Glu Asn Pro Ser Ala Asn Gly Arg Tyr Leu Met Val Glu Arg Val Ala
 245 250 255

His Tyr Ser Asp Ile Leu Lys Ile Leu Arg Asp Leu Tyr Pro Thr Met
 260 265 270

Gln Leu Pro Glu Lys Cys Ala Asp Asp Asn Pro Leu Met Gln Asn Tyr
 275 280 285

Gln Val Ser Lys Glu Lys Ala Lys Ser Leu Gly Ile Glu Phe Thr Thr
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Leu Glu Glu Ser Ile Lys Glu Thr Val Glu Ser Leu Lys Glu Lys Lys
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Phe Phe Gly Gly Ser Ser Ser Met
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<213> Artificial sequence

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<212> DNA
<213> Lycopersicon esculentum

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gatggaccta gtttggattg tacattgatg aattatattg atacactcac ccaacgtatc 240
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gcgataatta atgttacaat tggcactact tttaaaggag ctgttgatga tcttgatgtt 720
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gcagcactaa atggacttat tattcctttt attaaaaata tgattacttt caagaagcca 840
attggaagtg tgacaatttc tggtcacaag tttttgggat gtccaatgcc ttgtggagtt 900
caaataacaa ggaaaagtta cattaataac ctttcgagaa gagtogaata tattgcttct 960

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gtggatgcta caatttcttg aagtcgaaat ggtttgactc cgatcttctt atggtacagt      1020
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aagtacttga aagaccgtct tcagcaagca ggaatcagcg tcatgctgaa tgagcttagc      1140
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tgtgtgagag atatggcaca tgttattggt atgccaggca taactagaga aactcttgat      1260
ggttttatta atgatttgct tcaacaaagg aaaaaatggg atcaagatgg aagaattagc      1320
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<210> 5

<211> 465

<212> PRT

<213> Lycopersicon esculentum

<400> 5

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Met Gly Ser Leu Ser Phe Glu Lys Asp Phe Glu Pro Ser Ala Ile Thr
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Pro Arg Gly Leu Ala Pro Pro Gly Leu Ile Val Asn Gly Asp Phe Gly
          20           25           30

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Glu Met Met Arg Leu Lys Val Ser Ser Thr Pro Thr Thr Pro Arg Lys
          35           40           45

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Asn Leu Asn Leu Ser Val Thr Glu Pro Gly Lys Asn Asp Gly Pro Ser
          50           55           60

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Leu Asp Cys Thr Leu Met Asn Tyr Ile Asp Thr Leu Thr Gln Arg Ile
65           70           75           80

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```

Asn Tyr His Ile Gly Tyr Pro Val Asn Ile Cys Tyr Glu His Tyr Ala
          85           90           95

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Asn Leu Ala Pro Leu Leu Gln Phe His Leu Asn Asn Cys Gly Asp Pro
          100          105          110

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Phe Leu Gln Asn Thr Val Asp Phe His Ser Lys Asp Phe Glu Val Ala
          115          120          125

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Val Leu Asn Trp Phe Ala Asp Leu Trp Glu Ile Glu Arg Asp Gln Tyr
 130 135 140

Trp Gly Tyr Val Thr Asn Gly Gly Thr Glu Gly Asn Leu His Gly Ile
 145 150 155 160

Leu Val Gly Arg Glu Leu Phe Pro Asp Gly Ile Leu Tyr Ala Ser Lys
 165 170 175

Asp Ser His Tyr Ser Val Ala Lys Ala Ala Met Met Tyr Arg Met Asp
 180 185 190

Phe Glu Asn Ile Asn Ala Ser Ile Asn Gly Glu Ile Asp Tyr Ser Asp
 195 200 205

Leu Lys Val Lys Leu Leu Gln Asn Lys Gly Lys Pro Ala Ile Ile Asn
 210 215 220

Val Thr Ile Gly Thr Thr Phe Lys Gly Ala Val Asp Asp Leu Asp Val
 225 230 235 240

Ile Leu Gln Ile Leu Glu Glu Cys Gly Tyr Thr Arg Asp Gln Phe Tyr
 245 250 255

Ile His Cys Asp Ala Ala Leu Asn Gly Leu Ile Ile Pro Phe Ile Lys
 260 265 270

Asn Met Ile Thr Phe Lys Lys Pro Ile Gly Ser Val Thr Ile Ser Gly
 275 280 285

His Lys Phe Leu Gly Cys Pro Met Pro Cys Gly Val Gln Ile Thr Arg
 290 295 300

Lys Ser Tyr Ile Asn Asn Leu Ser Arg Arg Val Glu Tyr Ile Ala Ser
 305 310 315 320

Val Asp Ala Thr Ile Ser Gly Ser Arg Asn Gly Leu Thr Pro Ile Phe
 325 330 335

Leu Trp Tyr Ser Ile Ser Ala Lys Gly Gln Ile Gly Phe Gln Lys Asp

340

345

350

Val Lys Arg Cys Phe Asp Asn Ala Lys Tyr Leu Lys Asp Arg Leu Gln
 355 360 365

Gln Ala Gly Ile Ser Val Met Leu Asn Glu Leu Ser Ile Ile Val Val
 370 375 380

Leu Glu Arg Pro Arg Asp His Glu Phe Val Arg Arg Trp Gln Leu Ser
 385 390 395 400

Cys Val Arg Asp Met Ala His Val Ile Val Met Pro Gly Ile Thr Arg
 405 410 415

Glu Thr Leu Asp Gly Phe Ile Asn Asp Leu Leu Gln Gln Arg Lys Lys
 420 425 430

Trp Tyr Gln Asp Gly Arg Ile Ser Pro Pro Cys Val Ala Asn Asp Ile
 435 440 445

Gly Ala Gln Asn Cys Ala Cys Ser Tyr His Lys Ile Asp Tyr Ile Ile
 450 455 460

Ala
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 <211> 1416
 <212> DNA
 <213> Lycopersicon esculentum

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 gagcctgcat tgaagaatga tggctccttct ttggacacta tcttggttaa ttatttggac 240
 acacttacac aacgagtcaa ttatcattta ggttatccag tcaacatatg ttatgatcac 300
 tatgcaacgc tagcaccact tttgcagttt cacctaaaca attgtggtga tcttttcta 360
 caaaatactg tcgatttcca ttctaaagac tttgaagtgg ctgttttgaa tgggtttgca 420

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aaactttggg aaattgaaaa ggatcaatat tggggatatg ttaccaatgg tggcaccgaa      480
ggcaatctcc atgggtatttt gttagggaga gagctacttc ctgaaggaat attatatgca      540
tcaaaagaact ctcatctactc agtattcaaa gctgcaagaa tgtatagaat ggattcagaa      600
acaatcaaca catcagtaaa tggagagatg gattattcag atttaagagc aaagttactt      660
caaaataagg ataaaccagc tattataaat gtcacaattg gaactacatt caaaggagca      720
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attttcttat ggtatagctt gagcgcaaaa ggtcaagttg gacttcaaaa ggatgttaaa     1080
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caaaatggaa agactgatcc tccttgtgtt ggagaggata ttggtgctca aaattgtgca     1380
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<210> 7

<211> 471

<212> PRT

<213> Lycopersicon esculentum

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Pro Arg Ser Leu Ala Ala Met Thr Pro Arg Ser Leu Ala Arg Arg Arg
                20              25              30

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Leu Phe Pro Asn Val Asp Asn Lys Lys Gln Lys Met Ala Gln Pro Gly
35              40              45

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Ala Gly Pro Arg Lys Asn Leu Glu Leu Glu Val Met Glu Pro Ala Leu

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50

55

60

Lys Asn Asp Gly Pro Ser Leu Asp Thr Ile Leu Val Asn Tyr Leu Asp
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Thr Leu Thr Gln Arg Val Asn Tyr His Leu Gly Tyr Pro Val Asn Ile
85 90 95

Cys Tyr Asp His Tyr Ala Thr Leu Ala Pro Leu Leu Gln Phe His Leu
100 105 110

Asn Asn Cys Gly Asp Pro Phe Leu Gln Asn Thr Val Asp Phe His Ser
115 120 125

Lys Asp Phe Glu Val Ala Val Leu Asn Trp Phe Ala Lys Leu Trp Glu
130 135 140

Ile Glu Lys Asp Gln Tyr Trp Gly Tyr Val Thr Asn Gly Gly Thr Glu
145 150 155 160

Gly Asn Leu His Gly Ile Leu Leu Gly Arg Glu Leu Leu Pro Glu Gly
165 170 175

Ile Leu Tyr Ala Ser Lys Asp Ser His Tyr Ser Val Phe Lys Ala Ala
180 185 190

Arg Met Tyr Arg Met Asp Ser Glu Thr Ile Asn Thr Ser Val Asn Gly
195 200 205

Glu Met Asp Tyr Ser Asp Leu Arg Ala Lys Leu Leu Gln Asn Lys Asp
210 215 220

Lys Pro Ala Ile Ile Asn Val Thr Ile Gly Thr Thr Phe Lys Gly Ala
225 230 235 240

Ile Asp Asp Leu Asp Val Ile Leu Glu Ile Leu Lys Glu Cys Gly Tyr
245 250 255

Ser Gln Asp Arg Phe Tyr Ile His Cys Asp Ala Ala Leu Cys Gly Leu
260 265 270

Met Thr Pro Phe Ile Asn Asn Met Ile Ser Phe Lys Lys Pro Ile Gly
 275 280 285

Ser Val Thr Ile Ser Gly His Lys Phe Leu Gly Cys Pro Met Pro Cys
 290 295 300

Gly Val Gln Ile Thr Arg Lys Ser Tyr Ile Asn Asn Leu Ser Thr Asn
 305 310 315 320

Val Glu Tyr Ile Ala Ser Val Asp Ala Thr Ile Ser Gly Ser Arg Asn
 325 330 335

Gly Leu Thr Pro Ile Phe Leu Trp Tyr Ser Leu Ser Ala Lys Gly Gln
 340 345 350

Val Gly Leu Gln Lys Asp Val Lys Arg Cys Leu Asp Asn Ala Lys Tyr
 355 360 365

Leu Lys Asp Arg Leu Gln Gln Ala Gly Ile Ser Val Met Leu Asn Glu
 370 375 380

Leu Ser Ile Ile Val Val Leu Glu Arg Pro Arg Asp His Glu Phe Val
 385 390 395 400

Arg Arg Trp Gln Leu Ser Cys Val Lys Asp Met Ala His Val Ile Val
 405 410 415

Met Pro Gly Ile Thr Arg Glu Met Leu Asp Asn Phe Met Ser Glu Leu
 420 425 430

Val Gln Gln Arg Lys Val Trp Tyr Gln Asn Gly Lys Thr Asp Pro Pro
 435 440 445

Cys Val Gly Glu Asp Ile Gly Ala Gln Asn Cys Ala Cys Ser Tyr His
 450 455 460

Lys Ile Asp Tyr Ile Cys Pro
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<210> 8
 <211> 1416
 <212> DNA

<213> *Lycopersicon pennellii*

<400> 8

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tatgcaactt tagcaccact tttacagttt cacctaaaca attgtgggtga tcctttccta      360
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caaaatggac agaccaatcc tccttggtgt ggagaggata ttggtgctca aaattgtgca      1380
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<211> 471

<212> PRT

<213> *Lycopersicon pennellii*

<400> 9

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Leu Phe Pro Asn Val Asp Asn Lys Lys Gln Lys Val Gln Gln Ser Gly
35 40 45

Ala Gly Pro Arg Lys Asn Leu Gln Leu Glu Val Met Glu Pro Ala Leu
50 55 60

Asn Asn Ala Gly Pro Ser Leu Asp Thr Ile Leu Val Asn Tyr Leu Asp
65 70 75 80

Thr Leu Thr Gln Arg Val Asn Tyr His Leu Gly Tyr Pro Val Asn Ile
85 90 95

Cys Tyr Asp His Tyr Ala Thr Leu Ala Pro Leu Leu Gln Phe His Leu
100 105 110

Asn Asn Cys Gly Asp Pro Phe Leu Gln Asn Thr Val Asp Phe His Ser
115 120 125

Lys Asp Phe Glu Val Ala Val Leu Asn Trp Phe Ala Lys Leu Trp Glu
130 135 140

Ile Glu Lys Asp Gln Tyr Trp Gly Tyr Val Thr Asn Gly Gly Thr Glu
145 150 155 160

Gly Asn Leu His Gly Ile Leu Leu Gly Arg Glu Leu Leu Pro Asp Gly
165 170 175

Ile Leu Tyr Ala Ser Lys Asp Ser His Tyr Ser Val Phe Lys Ala Ala
180 185 190

Arg Met Tyr Arg Met Asp Ser Glu Thr Ile Asn Thr Ser Val Asn Gly
195 200 205

Glu Met Asp Tyr Ser Asp Leu Arg Ala Lys Leu Leu Gln Asn Lys Asp
 210 215 220

Lys Pro Ala Ile Ile Asn Val Thr Ile Gly Thr Thr Phe Lys Gly Ala
 225 230 235 240

Ile Asp Asp Leu Asp Val Ile Leu Glu Thr Leu Lys Glu Cys Gly Tyr
 245 250 255

Ser Gln Asp Arg Phe Tyr Ile His Cys Asp Ala Ala Leu Cys Gly Leu
 260 265 270

Met Thr Pro Phe Ile Asn Asn Met Ile Ser Phe Lys Lys Pro Ile Gly
 275 280 285

Ser Val Thr Ile Ser Gly His Lys Phe Leu Gly Cys Pro Met Pro Cys
 290 295 300

Gly Val Gln Ile Thr Arg Lys Ser Tyr Ile Asn Asn Leu Ser Thr Asn
 305 310 315 320

Val Glu Tyr Ile Ala Ser Val Asp Ala Thr Ile Ser Gly Ser Arg Asn
 325 330 335

Gly Leu Thr Pro Ile Phe Leu Trp Tyr Ser Leu Ser Ala Lys Gly Gln
 340 345 350

Val Gly Leu Gln Lys Asp Val Lys Arg Cys Leu Asp Asn Ala Lys Tyr
 355 360 365

Leu Lys Asp Arg Leu Gln Lys Ala Gly Ile Ser Val Met Leu Asn Glu
 370 375 380

Leu Ser Ile Ile Val Val Leu Glu Arg Pro Arg Asp His Glu Phe Val
 385 390 395 400

Arg Arg Trp Gln Leu Ser Cys Val Lys Asp Met Ala His Val Ile Val
 405 410 415

Met Pro Gly Ile Thr Arg Glu Met Leu Asp Asn Phe Thr Ser Glu Leu
 420 425 430

Val Gln Gln Arg Lys Val Trp Tyr Gln Asn Gly Gln Thr Asn Pro Pro
 435 440 445

Cys Val Gly Glu Asp Ile Gly Ala Gln Asn Cys Ala Cys Ser Tyr His
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Lys Ile Asp Tyr Ile Cys Pro
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<211> 993

<212> DNA

<213> *Lycopersicon esculentum*

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cagcctaccc ttaataccag ttctgctgca gtcttgaact tggtaaattg tgccgagaca      660
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gcatttgaga acccttcagc taatgggaga tatttgatgg ttgagagagt tgcacactat      780
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aagaagtttt ttggaggctc atctgctatg tga      993

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<210> 11
 <211> 330
 <212> PRT
 <213> Lycopersicon esculentum

<400> 11

Met Ser Ser Val Ala Ala Thr Lys Thr Val Cys Val Thr Gly Ala Ser
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Gly Tyr Ile Ala Ser Trp Leu Val Asn Phe Leu Leu Gln Arg Gly Tyr
 20 25 30

Thr Val Lys Ala Ser Val Arg Asp Pro Asn Asp Pro Lys Lys Thr Gln
 35 40 45

His Leu Ile Ser Leu Gly Gly Ala Lys Glu Arg Leu His Leu Phe Lys
 50 55 60

Ala Asn Leu Leu Glu Glu Gly Ser Phe Asp Ala Val Val Asp Gly Cys
 65 70 75 80

Glu Gly Val Phe His Thr Ala Ser Pro Phe Tyr Tyr Ser Val Thr Asp
 85 90 95

Pro Gln Ala Glu Leu Leu Asp Pro Ala Val Lys Gly Thr Leu Asn Leu
 100 105 110

Leu Gly Ser Cys Ala Lys Ala Pro Ser Val Lys Arg Val Val Leu Thr
 115 120 125

Ser Ser Ile Ala Ala Val Ala Tyr Ser Gly Glu Pro Arg Thr Pro Glu
 130 135 140

Val Val Val Asp Glu Ser Trp Trp Thr Ser Pro Asp Tyr Cys Arg Glu
 145 150 155 160

Lys Gln Leu Trp Tyr Val Leu Ser Lys Thr Leu Ala Glu Asp Ala Ala
 165 170 175

Trp Lys Phe Val Lys Glu Lys Gly Ile Asp Met Val Ala Ile Asn Pro
 180 185 190

Ala Met Val Ile Gly Pro Leu Leu Gln Pro Thr Leu Asn Thr Ser Ser
195 200 205

Ala Ala Val Leu Asn Leu Val Asn Gly Ala Glu Thr Tyr Pro Asn Ala
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Thr Phe Gly Trp Val Asn Val Lys Asp Val Ala Asn Ala His Ile Leu
225 230 235 240

Ala Phe Glu Asn Pro Ser Ala Asn Gly Arg Tyr Leu Met Val Glu Arg
245 250 255

Val Ala His Tyr Ser Asp Ile Leu Lys Ile Leu Arg Glu Leu Tyr Pro
260 265 270

Thr Met Arg Leu Pro Glu Lys Cys Ala Asp Asp Asn Pro Leu Met Gln
275 280 285

Asn Tyr Gln Val Ser Lys Glu Arg Ala Lys Ser Leu Gly Val Glu Phe
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Leu Phe Pro Asn Val Asp Asn Lys Lys Gln Lys Val Glu Gln Ser Gly
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Asn Asn Asn Gly Pro Ser Leu Asp Thr Ile Leu Val Asn Tyr Leu Asp
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Thr Leu Thr Gln Arg Val Asn Tyr His Leu Gly Tyr Pro Val Asn Ile
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Cys Tyr Asp His Tyr Ala Ser Leu Ala Pro Leu Leu Gln Phe His Leu
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Asn Asn Cys Gly Asp Pro Phe Leu Gln Asn Thr Val Asp Phe His Ser
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Lys Asp Phe Glu Val Ala Val Leu Asp Trp Phe Ala Lys Leu Trp Glu
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Ile Glu Lys Asp Gln Tyr Trp Gly Tyr Val Thr Asn Gly Gly Thr Glu
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Gly Asn Leu His Gly Ile Leu Leu Gly Arg Glu Leu Leu Pro Glu Gly
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Ile Leu Tyr Ala Ser Lys Asp Ser His Tyr Ser Val Phe Lys Ala Ala
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Arg Met Tyr Arg Met Asp Ser Glu Thr Ile Asn Thr Ser Val Thr Gly
195 200 205

Glu Met Asp Tyr Ser Asp Leu Arg Ala Lys Leu Leu Gln Asn Lys Asp
210 215 220

Lys Pro Ala Ile Ile Asn Val Thr Ile Gly Thr Thr Phe Lys Gly Ala
225 230 235 240

Ile Asp Asp Leu Asp Val Ile Leu Glu Thr Leu Lys Glu Cys Gly Tyr
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Ser Gln Asp Arg Phe Tyr Ile His Cys Asp Ala Ala Leu Cys Gly Leu
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Met Thr Pro Phe Ile Asn Asn Met Ile Ser Phe Lys Lys Pro Ile Gly
 275 280 285

Ser Val Thr Ile Ser Gly His Lys Phe Leu Gly Cys Pro Met Pro Cys
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Gly Val Gln Ile Thr Arg Lys Ser Tyr Ile Asn Asn Leu Ser Thr Asn
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Val Glu Tyr Ile Ala Ser Val Asp Ala Thr Ile Ser Gly Ser Arg Asn
 325 330 335

Gly Leu Thr Pro Ile Phe Leu Trp Tyr Ser Leu Ser Ala Lys Gly Gln
 340 345 350

Val Gly Leu Gln Lys Asp Val Lys Arg Cys Leu Asp Asn Ala Lys Tyr
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Leu Lys Asn Arg Leu Gln Gln Ala Gly Ile Ser Val Met Leu Asn Glu
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Leu Ser Ile Ile Val Val Leu Glu Arg Pro Arg Asp His Glu Phe Val
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Arg Arg Trp Gln Leu Ser Cys Val Lys Asp Met Ala His Val Ile Val
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Met Pro Gly Ile Thr Arg Glu Met Leu Asp Asn Phe Val Ser Glu Leu
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Val Gln Gln Arg Lys Gln Trp Tyr Arg Asp Gly Lys Ala Glu Ala Pro
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Cys Val Gly Glu Asp Ile Gly Ala Gln Asn Cys Ala Cys Ser Tyr His
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Lys Ile Asp Tyr Ile Gly Pro
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